

**IN THE CLAIMS**

Please replace the claims with the following set of claims, in which claims 9 - 10, 11 - 14, and 19 - 22 are cancelled without prejudice or disclaimer.

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1. {PREVIOUSLY AMENDED} An electrical interconnection system comprising:
- a rotary transformer for coupling to a first electrical system and to a second electrical system, the rotary transformer comprising:
    - a rotor connected to the first electrical system;
    - a stator connected to the second electrical system;
    - a controller which adjusts an angular position of the rotary transformer, the controller comprising:
      - a first control unit which compares an input order power signal  $P_o$  to a measured power signal  $P_i$  being transferred between the first electrical system and the second electrical system to generate a requested angular velocity signal  $\omega_o$ ;
      - a second control unit which compares the requested angular velocity signal  $\omega_o$  to a measured angular velocity signal  $\omega_r$  of the rotary transformer to generate a drive signal  $T_o$ .
2. (ORIGINAL) The system of claim 1, wherein the controller adjusts an angular position of the rotary transformer so that a predetermined power is transferred from the first electrical system to the second electrical system.
4. (ORIGINAL) The system of claim 1, wherein the controller has a bandwidth chosen to dampen inherent oscillations in the interconnection system.
5. (ORIGINAL) The system of claim 1, wherein the first electrical system and the second electrical system are a respective first electrical utility company and a second electric utility company.

6. {PREVIOUSLY AMENDED} The system of claim 1, wherein the interconnection system further comprises a torque control unit for rotating the rotor.

7. (ORIGINAL) The system of claim 6, wherein the controller controls the torque control unit whereby the rotor is rotated at a variable speed.

8. (ORIGINAL) The system of claim 7, wherein the controller controls the torque control unit whereby the rotor is bi-directionally rotated at a variable speed.

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9. [CANCELLED] An electrical interconnection system comprising:  
a rotary transformer for coupling to a first electrical system and to a second electrical system, the rotary transformer comprising:  
a rotor connected to the first electrical system;  
a stator connected to the second electrical system;  
a controller which adjusts an angular position of the rotary transformer;  
a torque control unit for rotating the rotor, wherein the torque control unit is a motor; and  
a gear for interfacing the motor with the rotor.

10. [CANCELLED] The system of claim 9, wherein the gear is a worm gear.

11. [CANCELLED] An electrical interconnection system comprising:  
a rotary transformer for coupling to a first electrical system and to a second electrical system, the rotary transformer comprising:  
a rotor connected to the first electrical system;  
a stator connected to the second electrical system;  
a controller which adjusts an angular position of the rotary transformer;

a torque control unit for rotating the rotor, wherein the torque control unit is integrated with the stator and the rotor.

12. ~~{CANCELLED}~~ The system of claim 11, wherein the torque control unit is integrated with the stator and the rotor in a squirrel cage inductor configuration.

13. ~~{CANCELLED}~~ The system of claim 11, wherein the torque control unit is integrated with the stator and the rotor in a DC-excited rotor synchronous configuration.

14. ~~{CANCELLED}~~ The system of claim 11, wherein the torque control unit is integrated with the stator and the rotor in a wound rotor AC configuration.

15. {PREVIOUSLY AMENDED} A substation for electrically interconnecting a first electrical system and to a second electrical system, the first electrical system and the second electrical system having a differing electrical characteristic, the substation comprising:

- a step-down transformer coupled to the first electrical system;
- a step-up transformer coupled to the second electrical system;
- a rotary transformer coupled to the step-down transformer and to the step-up transformer, the rotary transformer comprising:
  - a rotor connected to a first of the step-down and step-up transformers;
  - a stator connected to a second of the step-down and step-up transformers;
  - a controller which adjusts an angular position of the rotary transformer so that a predetermined power is transferred from the first electrical system to the second electrical system, the controller comprising:
    - a first control unit which compares an input order power signal  $P_o$  to a measured power signal  $P_i$  being transferred between the first electrical system and the second electrical system to generate a requested angular velocity signal  $\omega_o$ ;

a second control unit which compares the requested angular velocity signal  $\omega_o$  to a measured angular velocity signal  $\omega_r$  of the rotary transformer to generate a drive signal  $T_o$ .

16. (ORIGINAL) The system of claim 15, wherein the controller bi-directionally operates the rotary transformer at a variable speed for transferring power from the first electrical system to the second electrical system.

DI 17. (ORIGINAL) The system of claim 15, wherein the rotary transformer comprises:  
a rotor connected to a first of the step-down and step-up transformers;  
a stator connected to a second of the step-down and step-up transformers;  
and wherein the interconnection system further comprises an torque control unit for rotating the rotor.

18. (ORIGINAL) The system of claim 17, wherein the controller controls the torque control unit whereby the rotor is rotated at a variable speed.

19. ~~{CANCELLED}~~ A substation for electrically interconnecting a first electrical system and to a second electrical system, the first electrical system and the second electrical system having a differing electrical characteristic, the substation comprising:  
a step-down transformer coupled to the first electrical system;  
a step-up transformer coupled to the second electrical system;  
a rotary transformer coupled to the step-down transformer and to the step-up transformer, the rotary transformer comprising:  
a rotor connected to a first of the step-down and step-up transformers;  
a stator connected to a second of the step-down and step-up transformers;  
a controller which adjusts an angular position of the rotary transformer so that a predetermined power is transferred from the first electrical system to the second electrical system;

a torque control unit for rotating the rotor, wherein the torque control unit is integrated with the stator and the rotor.

20. ~~CANCELLED~~ The system of claim 19, wherein the torque control unit is integrated with the stator and the rotor in a squirrel cage inductor configuration.

21. ~~CANCELLED~~ The system of claim 19, wherein the torque control unit is integrated with the stator and the rotor in a DC-excited rotor synchronous configuration.

22. ~~CANCELLED~~ The system of claim 19, wherein the torque control unit is integrated with the stator and the rotor in a wound rotor AC configuration.

24.. (ORIGINAL) The system of claim 15, wherein the controller has a bandwidth chosen to dampen inherent oscillations in the interconnection system.

25. {PREVIOUSLY AMENDED} An electrical interconnection system comprising:  
a rotary transformer for coupling to a first electrical system and to a second electrical system, the rotary transformer comprising:  
a rotor connected to the first electrical system;  
a stator connected to the second electrical system;  
a closed loop angular positioning control system which operates the rotary transformer for transferring power from the first electrical system to the second electrical system.

26. (ORIGINAL) The system of claim 25, wherein the controller has a bandwidth chosen to dampen inherent oscillations in the interconnection system.

27. {PREVIOUSLY AMENDED} A method of interconnecting two electrical systems, the method comprising:

coupling a rotor of a rotary transformer to a first electrical system and a stator of the rotary transformer to a second electrical system;

adjusting an angular position of the rotary transformer so that a predetermined power is transferred from the first electrical system to the second electrical system, the adjusting being performed by a closed loop angular positioning control system which operates the rotary transformer for transferring power from the first electrical system to the second electrical system.

28. (ORIGINAL) The method of claim 27, further comprising:

comparing an input order power signal  $P_o$  to a measured power signal  $P_i$  being transferred between the first electrical system and the second electrical system to generate a requested angular velocity signal  $\omega_o$ ;

comparing the requested angular velocity signal  $\omega_o$  to a measured angular velocity signal  $\omega_r$  of the rotary transformer to generate a drive signal  $T_o$ .

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